

Lime Stabilization Of Expansive Soils Ut Arlington

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Masters Abstracts International - 1988

Transportation Research Record - 2000

Soil and Rock America 2003 - Patricia J. Culligan 2003

Site and Geomaterial Characterization - Anand J. Puppala 2006

GSP 149 contains 40 papers on site and geomaterial characterization presented at the GeoShanghai Conference, held in Shanghai, China, June 6-8, 2006.

Proceedings of GeoShanghai 2018 International Conference: Ground Improvement and Geosynthetics - Lin Li 2018-05-10

This book is the eighth volume of the proceedings of the 4th GeoShanghai International Conference that was held on May 27 - 30, 2018. This book, entitled "Ground Improvement and Geosynthetics", presents the latest information on the new technologies and practical applications in various geotechnical engineering projects and advancements on ground improvement and geosynthetics. This volume presents detailed design procedures and examples to demonstrate the applications of the latest ground improvement technologies and innovative geosynthetics in geotechnical engineering. Topics include pile/column technology as foundations, retaining structures, or embankment supports, physical and chemical technologies for soil stabilization and ground improvement, geosynthetic reinforcement for roads, slopes, retaining walls, and foundations.

Each of the papers included in this book received at least two positive peer reviews. The editors would like to express their sincerest appreciation to all of the anonymous reviewers all over the world, for their diligent work.

Stabilization of High Sulfate Soils - Nagasreenivasu Talluri 2013

Stabilization of expansive soils using lime and cement additives have been used by practitioners over the years. However, recent heaving and premature pavement failures in lime and cement-treated subgrades containing sulfates led to questioning the validity of calcium-based stabilization. When expansive soils containing sulfates are treated with calcium-based stabilizers, the calcium from the stabilizer reacts with soil sulfates and alumina to form the expansive mineral Ettringite. Formation and growth of the mineral Ettringite has been reported as the cause of severe heaving in several pavement failures. Under favorable environmental conditions, Ettringite transforms itself into another expansive mineral, Thaumasite. This heaving is termed as 'sulfate-induced heave' in literature. Several theories have been proposed to understand the heaving mechanisms in sulfate bearing soils. Based on the theoretical background, researchers and practitioners have proposed various methods to treat sulfate soils. Applicability of these methods is mostly limited to soils containing sulfate content less than 8,000 ppm. Soils with sulfate content above 8,000 ppm are termed as 'high sulfate' soils, and chemical treatment of such soils is currently not considered. Hence there exists a research need to create better

understanding of the heaving phenomenon in soils with higher sulfate contents and develop practical techniques for stabilizing such soils. This research is designed to aid in understanding the heaving phenomenon in soils with sulfate contents above 8,000 ppm and to develop practical techniques to stabilize such soils. Six soils: four high plasticity clays, one low-plasticity clay soil and one high-plasticity silt, with sulfate contents varying from 200 ppm - 44,000 ppm, were considered for this research. Chemical and mineralogical tests were performed on the untreated soils to establish the clay mineral distribution and composition of the soils. Additional Gypsum was added to the soils with sulfate contents below 8,000 ppm so they could be considered as 'high sulfate'. These soils were treated with lime and mellowed for periods of zero, three and seven days. Following the mellowing, the samples were remixed, compacted and subjected to various engineering, mineralogical and chemical tests. The present high-sulfate soils were treated lime stabilization with varying mellowing periods and treated soils after treatment were subjected to the engineering and chemical tests. Tests results were analyzed to understand the effectiveness of mellowing period on the heaving phenomenon of 'high sulfate' soils. Both Ettringite formation and crystal growth have contributed significantly to the overall swell of the treated soils. Swell trends observed in the treated soils at respective mellowing periods were attributed to the variability in sulfate levels and reactive alumina and silica contents. Treated soils at higher mellowing periods showed lesser sulfate induced heaving when sulfate levels are lesser than 30,000 ppm. At higher sulfate levels, the mellowing did not result in effective treatment of soils. It was also observed that compaction void ratios and soil clay mineralogy have a significant impact on the swell behavior of chemically treated high-sulfate soils at different mellowing periods. Hence, mellowing effectiveness is explained using free energy and massvolume approaches. Threshold void ratio framework comprising of natural soil void ratio and sulfate content was developed to predict Ettringite-induced heaving in chemically treated high sulfate soils at different mellowing periods. Another treatment method using lime-fly ash

treatment is also studied on two soils and the test results showed that the combined treatment has resulted in lesser soil heaving in these soils. The improvements here are mainly attributed to low amounts of calcium in the combined chemical additive used here. In the final study, the rate of Ettringite formation and growth in the treated soils was indirectly assessed by measuring stiffness properties using the Bender Element tests. Bender Element tests revealed material softening and subsequent stiffness degradation in chemically treated high-sulfate soils, and threshold stiffness loss values were established for the treated soils. This non-destructive study assessment can be used to evaluate the Ettringite induced soil heaving in sulfate soils under various chemical treatments. *Specialized Transportation 1991* - National Research Council (U.S.). Transportation Research Board 1991

Recent Advancements on Expansive Soils -

John S. McCartney 2018-10-29

This volume includes a collection of technical papers on an important topic in geotechnical engineering; the behavior and treatment of expansive soils. The research studies include investigations into novel stabilization techniques for expansive soils using different admixtures or mechanical consolidation techniques, as well as new experimental approaches to evaluate the behavior of expansive soils. They also include an evaluation of wetting boundary conditions on the volume change of expansive soils, as well as the role of hydrologic boundary conditions in arid climates. The volume is based on the best contributions to the 2nd GeoMEast International Congress and Exhibition on Sustainable Civil Infrastructures, Egypt 2018 - The official international congress of the Soil-Structure Interaction Group in Egypt (SSIGE).

Ground Improvement Case Histories - Buddhima Indraratna 2015-05-28

Written by an international group of experts, *Ground Improvement Case Histories: Chemical, Electrokinetic, Thermal and Bioengineering Methods* provides over 700 pages of case-histories collected from all over the world. Each case-history provides an overview of the specific technology followed by applications, and in some cases, comprehensive back analysis through

numerical modelling is discussed. The book includes methods for employing bacterial and biological treatment, and native vegetation for stabilizing problematic soils. Specific case-histories included in the book are: Effect of Drainage and Grouting for the World Longest Seikan Undersea Tunnel Construction, Cement/lime Mixing Ground Improvement for Road Construction on Soft Ground, Use of Jet Grouting in Deep Excavations, and Stabilization of Reactive Sulphide Mine Tailings using Water Cover Technology. Provides recent case histories using chemical and bio-engineering methods by world-renowned engineering experts Includes over 200 illustrations and 150 equations from relevant topics, including state-of-the-art chemical and bioengineering methods Presents comprehensive analysis methods using numerical modelling methods Case histories include the "Effect of Drainage and Grouting on the World's Longest Seikan Undersea Tunnel Construction" and "Cement/Lime Mixing Ground Improvement for Road Construction on Soft Ground"

Special Topics in Foundations - Braja M. Das 1988

GSP 16 contains seven papers presented at a session of the ASCE National Convention, held in Nashville, Tennessee, May 9, 1988. Sponsored by the Geotechnical Engineering Division of ASCE.

Eighth International Conference on Low-Volume Roads, 2003 - 2003

Performance Studies on Rigid Pavement Sections Built on Stabilized Sulfate Soils - Deepti Vasudev 2007

Overall, based on the long term analysis, Type V Cement-Fly ash treatments proved to be the most effective treatment for stabilizing sulfate bearing soils with no heave distress was followed by Type V Cement and GIBBS treatments.

Recent Advances in Structural Engineering and Construction Management - Kong Kian Hau 2022-09-27

This book presents the select proceedings of the International Conference on Structures, Materials and Construction (ICSMC 2021). It covers the recent developments and futuristic trends in the field of structural engineering and

construction management, including new building materials and understanding their behavior. The topic covered also assess the current progress and state-of-the-art techniques in structural experimentation, smart materials, structures technology, principles of construction management, materials properties and characterization. The collection of papers included in this proceeding will contribute to scientific developments in the field of structural engineering and construction and will be a useful as reference material for the academicians, researchers and most importantly the student community pursuing research in the fields of structural engineering and construction technology.

Bearing Capacity of Roads, Railways and Airfields - Andreas Loizos 2017-07-20

Bearing Capacity of Roads, Railways and Airfields includes the contributions to the 10th International Conference on the Bearing Capacity of Roads, Railways and Airfields (BCRRA 2017, 28-30 June 2017, Athens, Greece).

The papers cover aspects related to materials, laboratory testing, design, construction, maintenance and management systems of transport infrastructure, and focus on roads, railways and airfields. Additional aspects that concern new materials and characterization, alternative rehabilitation techniques, technological advances as well as pavement and railway track substructure sustainability are included. The contributions discuss new concepts and innovative solutions, and are concentrated but not limited on the following topics: · Unbound aggregate materials and soil properties · Bound materials characteristics, mechanical properties and testing · Effect of traffic loading · In-situ measurements techniques and monitoring · Structural evaluation · Pavement serviceability condition · Rehabilitation and maintenance issues · Geophysical assessment · Stabilization and reinforcement · Performance modeling · Environmental challenges · Life cycle assessment and sustainability Bearing Capacity of Roads, Railways and Airfields is essential reading for academics and professionals involved or interested in transport infrastructure systems, in particular roads, railways and airfields.

Perspectives in Civil Engineering - Jeffrey S. Russell 2003-01-01

This report contains 27 papers that serve as a testament to the state-of-the-art of civil engineering at the outset of the 21st century, as well as to commemorate the ASCE's Sesquicentennial. Written by the leading practitioners, educators, and researchers of civil engineering, each of these peer-reviewed papers explores a particular aspect of civil engineering knowledge and practice. Each paper explores the development of a particular civil engineering specialty, including milestones and future barriers, constraints, and opportunities. The papers celebrate the history, heritage, and accomplishments of the profession in all facets of practice, including construction facilities, special structures, engineering mechanics, surveying and mapping, irrigation and water quality, forensics, computing, materials, geotechnical engineering, hydraulic engineering, and transportation engineering. While each paper is unique, collectively they provide a snapshot of the profession while offering thoughtful predictions of likely developments in the years to come. Together the papers illuminate the mounting complexity facing civil engineering stemming from rapid growth in scientific knowledge, technological development, and human populations, especially in the last 50 years. An overarching theme is the need for systems-level approaches and consideration from undergraduate education through advanced engineering materials, processes, technologies, and design methods and tools. These papers speak to the need for civil engineers of all specialties to recognize and embrace the growing interconnectedness of the global infrastructure, economy, society, and the need to work for more sustainable, life-cycle-oriented solutions. While embracing the past and the present, the papers collected here clearly have an eye on the future needs of ASCE and the civil engineering profession.

Synthesis of Metakaolin-based Geopolymer and Its Performance as Sole Stabilizer of Expansive Soils - Rinu Ann Samuel 2020

Expansive soils have been stabilized using conventional soil stabilizers such as lime and cement for many decades. These conventional stabilizers form cementitious productions that

enhance the strength properties and reduce the swelling and shrinkage potential of expansive soils. However, the energy-intensive production operations of conventional soil stabilizers release substantial amounts of harmful greenhouse gases into the atmosphere. In addition, conventional soil stabilizers are also prone to durability issues, which make them somewhat ineffective as long-term solutions. Furthermore, the use of calcium-based stabilizers cause excessive swelling and shrinkage in sulfate-bearing subgrade soils due to the formation of highly expansive minerals like Ettringite. This study investigates the use of geopolymers as an alternative soil stabilizer for expansive soils. Geopolymers are aluminosilicate binders that have received much attention as a sustainable alternative to conventional chemical additives. Geopolymers have high compressive strengths and can be processed at room temperatures from aqueous solutions by utilizing waste materials (e.g. fly ash) or abundant natural sources (e.g. clay). Geopolymers have been investigated by a few researchers for the purpose of soil stabilization, although most studies were performed on non-expansive soils and focused solely on the ability of geopolymers to enhance soil strength. This study evaluates the performance of a metakaolin-based geopolymer in enhancing strength/stiffness, volume change, and long-term performance characteristics of expansive soils. The objective of this research is to synthesize a metakaolin-based geopolymer and evaluate its efficiency as the sole binder to stabilize expansive soils. Two expansive soils from north Texas were obtained and treated with the in house synthesized metakaolin-based geopolymer at different dosages for different curing periods. The following tasks were outlined to accomplish the objectives of this research: (1) synthesize metakaolin-based geopolymer and treat expansive soils with three different dosages, (2) perform basic, chemical, engineering, and mineralogical testing of control and geopolymer-treated soils, (3) treat expansive soils with lime to compare with geopolymer treatment, (4) analyze test results to evaluate efficiency of geopolymer to improve expansive soils, and (5) assess and compare sustainability and resiliency benefits of geopolymer and lime treatment for

expansive soils. Three dosages of the in-house synthesized metakaolin-based geopolymer was applied to both expansive soils and tested for different properties. The geopolymer dosages applied in this study are defined as the percentage weight of metakaolin in the geopolymer, with respect to the dry weight of soil to be treated. Geopolymer treatment was found to decrease the plasticity index of the expansive soils, with increasing dosage and curing period. Significant strength and stiffness enhancement was observed in geopolymer-treated soils. Negligible swelling and shrinkage potential were observed in soils treated with just low geopolymer dosages. Modified durability and leachability tests conducted revealed low strength loss in geopolymer-treated soils. Strength, swell, and modified durability test results of lime-treated soils were found to be comparable to results from geopolymer-treated soils. Microstructural studies provided insight into geopolymer gel formation that explains the enhanced macro-behavior of geopolymer-treated soils. Additionally, sustainability and resiliency assessment studies showed that geopolymers have a much lower impact on the environment than lime. Metakaolin-based geopolymers are evidently found to be quite efficient in stabilizing expansive soils. It is expected that the present research findings will be valuable for future investigations and design implementations of geopolymers as a more sustainable and 'green' alternative to conventional soil stabilizers.

Interim Report of Remedial Measures for Houses Damaged by Expansive Clay - University of Texas at Arlington. Construction Research Center 1977

Expansive Soils - Amer Ali Al-Rawas 2006-06-08
Expansive Soils provides the reader with easy and specific access to problems associated with expansive soils, characteristics and treatment, and evaluation and remediation. Set up with contributions from worldwide expert, this main reference guide is intended for engineers, researchers and senior students working on soil
Proceedings of the Indian Geotechnical Conference 2019 - Satyajit Patel 2021-04-22
This book comprises select proceedings of the annual conference of the Indian Geotechnical Society. The conference brings together

research and case histories on various aspects of geotechnical and geoenvironmental engineering. The book presents papers on geotechnical applications and case histories, covering topics such as (i) Characterization of Geomaterials and Physical Modelling; (ii) Foundations and Deep Excavations; (iii) Soil Stabilization and Ground Improvement; (iv) Geoenvironmental Engineering and Waste Material Utilization; (v) Soil Dynamics and Earthquake Geotechnical Engineering; (vi) Earth Retaining Structures, Dams and Embankments; (vii) Slope Stability and Landslides; (viii) Transportation Geotechnics; (ix) Geosynthetics Applications; (x) Computational, Analytical and Numerical Modelling; (xi) Rock Engineering, Tunnelling and Underground Constructions; (xii) Forensic Geotechnical Engineering and Case Studies; and (xiii) Others Topics: Behaviour of Unsaturated Soils, Offshore and Marine Geotechnics, Remote Sensing and GIS, Field Investigations, Instrumentation and Monitoring, Retrofitting of Geotechnical Structures, Reliability in Geotechnical Engineering, Geotechnical Education, Codes and Standards, and other relevant topics. The contents of this book are of interest to researchers and practicing engineers alike.

Lime for Environmental Uses - Kenneth A. Gutschick 1987

Unsaturated Soils, Two Volume Set - Olivier Buzzi 2009-11-02

Unsaturated soil mechanics is now increasingly recognized as an integral part of mainstream soil mechanics, and the importance and relevance of unsaturated soil mechanics for the broad field of geotechnical engineering no longer needs to be emphasized. The two volumes making up Unsaturated soils include papers from the 4th Asia Pacific Confere

Foundation Repair Manual - Robert Wade Brown 1999

The #1 guide to foundation repair This book offers the most authoritative source of information on repairing damaged foundations, with excellent advice on maintenance and preventative measures designed to avoid the need for repair. You get state-of-the-art methods in foundation repair; clear guidance on choosing the right methods for the job; up-to-date

techniques for preventing, evaluating, and reversing damage from expansive soils; expert instruction in hands-on techniques such as shimming interior pier caps and underpinning perimeter beams; help with mudjacking, deep pressure grouting, and chemical stabilization; foundation troubleshooting tips; preventative measures, including drainage, moisture barriers, and vegetation control; establishing the need for repair - plus help with estimates.

Development of a New Device to Evaluate Stabilization Durability of Expansive Soils by Addressing Wetting/drying and Leachate Issues - Priya Pravin Lad 2012

Expansive soils have been known to cause deterioration among all aspects of civil infrastructure for many years primarily due to the presence of clay minerals like Montmorillonite. Replacing these problematic soils is not a viable solution in that it is costly and time consuming. Although many stabilization techniques are available, chemical stabilization has proven to be an important tool in arresting the swell/shrink behavior of expansive soil, which is a major source of distress problems for most infrastructures built on this type of soils. Of the chemical stabilizers available in the market, lime and cement stabilizers are the two most widely used chemical additives for improving expansive clays and increasing the overlying structures integrity; they improve the soil's workability, strength, swelling potential, and bearing capacity. Generally, lime stabilization develops due to base-exchange and cementation between the clay particles and lime (Croft, 1967). On the other hand, cement stabilization improves soil properties as a result of cementitious bonds between the calcium silicate and aluminate hydration products present in cement and soil particles (Nelson and Miller, 1992). Furthermore, durability of the stabilization is an important aspect for any chemical stabilization design. To assess the durability of the stabilization design, chemically treated soil samples are subjected to wetting/drying studies to understand the longevity of the stabilization under climatic changes from summer to winter and vice versa. The samples are also subjected to leachate studies to determine the permanency of the stabilization due to rainfall infiltration.

Both of these studies are often conducted as separate studies on separate soil samples. However, in reality the wetting process and the rainfall infiltration occur simultaneously. Hence, a new research study was undertaken in which an attempt was made to combine both phases of durability studies and perform a combined study that addresses both the wetting/drying and leachate aspects of durability. For this purpose a new device was developed which can replicate rainfall infiltration and wetting processes simultaneously. This process reduces the time required for durability studies by half and the data obtained show that this approach is repeatable and provides new insights in understanding the durability of the chemical stabilization. A total of four soils were chosen along the pipe alignment in the IPL pipeline project for this study. These soils vary from low to high compressibility having plasticity index values ranging from 26 to 62, indicating medium to high expansiveness. Additionally, if these soils are used in the pipe bedding or haunch regions, they can cause excessive swelling pressures in the presence of water and damage the pipe, hence these soils were stabilized with either lime or cement-fly ash and were tested for durability in the newly developed combined device. Volumetric strains, weight changes, unconfined compressive strength changes and calcium ion concentrations were monitored over the course of the study. Many mix designs underwent durability, yet all four soils were stabilized effectively with 3% cement-10% fly ash as the treated soils completed 14 cycles of durability and maintained their strength. Although previous studies have shown similar results when tested with the conventional methods, further testing is recommended with both the conventional and combined methods for soils with similar PI. These additional tests will help further understand the similarities in the modified (combined) approach and the conventional methods.

2001 Second International Conference on Engineering Materials - 2001

Field and Experimental Studies to Assess the Performance of Stabilized Expansive Clay - Gautham Shantharam Pillappa 2005

A vast majority of the natural expansive soils are

montmorillonite-rich clays, over consolidated clays and shales. Certain sulfate rich soils such as those encountered in south Arlington also exhibit heaving after chemically treating them with calcium based stabilizers including cement and lime. Both swelling and softening of these soils induce damage to overlying pavement infrastructure. The present research was conducted at the University of Texas at Arlington as a part of a research study for the City of Arlington to explore and develop alternate stabilization methods for sulfate rich soils of South Arlington. Based on literature review of sulfate rich expansive soil treatments and comprehensive laboratory studies, the following four novel stabilizers were recommended for field treatment studies: Sulfate Resistant Cement (Type V), Low Calcium Class F Fly Ash with Type V Cement, Ground Granulated Blast Furnace Slag and Lime mixed with Polypropylene Fibers. The laboratory studies focused on Atterberg limits, unconfined compressive strength, resilient modulus, linear shrinkage, vertical swelling of chemically treated south Arlington soils. (Abstract shortened by UMI.).

Ground Characterization and Foundations - C. N. V. Satyanarayana Reddy 2021-10-28

This book comprises the select proceedings of the Indian Geotechnical Conference (IGC) 2020. The contents focus on recent developments in geotechnical engineering for a sustainable tomorrow. The book covers the topics related to traditional and latest methods in characterisation of ground at construction sites, recent technological developments/ advances in design of shallow and deep foundations in different subsoil conditions.

Ground Modification and Seismic Mitigation - Ali Porbaha 2006

GSP 152 contains 58 papers on ground modification for seismic mitigation presented at the GeoShanghai Conference, held in Shanghai, China, June 6-8, 2006.

Deep Mixing Technology for Mitigation of Swell-shrink Behavior of Expansive Soils of Moderate to Deep Active Depths - Raja Sekhar Madhyannapu 2007

Expansive soils are well known for their cyclic shrink-swell behavior due to seasonal related moisture changes. These cyclic movements of

expansive soils are due to physico-chemical changes at particle level that are dependent on mineralogical composition of these soils. The subsoil depths susceptible to moisture changes are known as active zones and based on previous studies vary from shallow to deep depths. Movements from these active depths reflect to the surface and cause considerable damages to overlying infrastructures. These damages are slow and time dependent as the in situ moisture fluctuations are slow and continue with time. Since the current chemical modification methods are ineffective for stabilization of expansive soils with moderate to deep active depths, researchers proposed deep soil mixing (DSM) technique using chemical binders. The effectiveness of this technique in minimizing swell-shrink behavior of expansive subsoils up to considerable depths was verified in present research by conducting comprehensive laboratory and field studies. Results from laboratory studies revealed that all combinations of lime and cement type binders produced shrink and swell potentials less than 0.5 and 0.1%, respectively. The strength properties of soils treated with binder compositions containing > 75% lime and 75% cement are about 1.8 to 5.2 times and 5 to 12 times the untreated soil strength. Simplified linear ranking analysis yielded combined lime-cement treatment (25% lime+75% cement) at 200 kg/m³ and 1.0 water-binder ratio as one of the best performing stabilizer and the same was adopted in the construction of two pilot DSM treated test sections. Quality assessment studies conducted during construction of test sections indicated that both field stiffness and strength values are 40% and 20 to 30% lower, respectively, compared to laboratory treatments. QA/QC studies based on laboratory, non-destructive and mineralogical data indicated consistent degree of mixing of soil-binder columns was achieved in field. Subsequent, field monitoring and non-destructive studies of DSM treated sections revealed that the overall performance as compared to untreated sections was successful in minimizing swell-shrink movements related to seasonal moisture changes.

Unsaturated Soils. Advances in Geo-Engineering - D.G. Toll 2008-06-23

Unsaturated Soils: Advances in Geo-Engineering

comprises 136 contributions from leading international researchers and practitioners, presented at the First European Conference on Unsaturated Soils (Durham, UK, 2-4 July 2008). The papers report on the latest advances in geo-engineering aspects of unsaturated soils. It is the first collection to focus

Interim Report of Experimental Foundation Designs on Expansive Clay Soils - University of Texas at Arlington. Construction Research Center 1976

Ground Improvement Techniques - Bujang B.K. Huat 2019-11-06

This book provides a review of problems during design and construction on problematic soils. Design methods, site investigation, construction and analysis of the various improvement methods available are explained and discussed. Various regions may have different soils with geotechnical problems that differ from those faced in other regions. For example, in Southeast Asia, the common geotechnical problems are those associated with construction on soft clays and organic soils, while in the arid region of the Middle East, problems are generally associated with the desert soils. In the US, the problems are associated with organic soils, expansive and collapsing soils, and shale. Laterite and lateritic soils are especially problematic in Mexico. Similarly, in Europe, for example, the geotechnical problems are associated with loess (France), and organic soil (Germany). A detailed description of various methods of ground improvement has been provided in 11 chapters. Each chapter deals not only with a description of the method but also focuses on region-specific ground problems and suitable ground improvement techniques. Case studies have also been included. One general chapter is dedicated to site investigation, instrumentation, assessment and control. This book will be of value to students and professionals in the fields of civil and geotechnical engineering, as well as to soil scientists and engineering geologists.

Laboratory and Field Study of a Liquid Ionic Soil Stabilizer - Sandesh Gautam 2019

Chemical stabilization of expansive soil has been practiced for quite a time now. The use of lime/cement stabilization as a traditional method

has been well acknowledged, understood and standard guidelines for practice have been developed. However, owing to certain demerits like high production and application cost, environmental impact, durability issues and most importantly incompatibility with high-sulfate soil leading to excessive heaving and swell, there is need to develop alternatives to these stabilizers. Non-traditional stabilizers like ionic soil stabilizer have been used by manufacturers in the past and claimed to effectively reduce the swell-shrink behavior of expansive soil. Undocumented results, the absence of laboratory tests, proprietary issues, however, have forced engineers to be reluctant about its use and accept it as suitable options to existing stabilizers. This study has focused on meeting existing shortcomings of the ionic stabilizers by studying their effect on expansive soil both in the laboratory and field. For this purpose, an ionic soil stabilizer was selected from the available commercial products in the market. The stabilizer was used to treat the expansive soil from Carrollton, Texas. The stabilizer was also used to treat a site in Burleson, Texas. The laboratory study focused on observing the effect of treatment on swell potential and strength of the soil at different application rates (1:150 and 1:300, volume of chemical to volume of water ratio) and curing days and validating the results through micro analysis of the soil. The laboratory tests include basic soil physical property and mechanical property tests such as Atterberg Limits test, bar linear shrinkage test, hydrometer test, standard compaction test, 1-D swell, and unconfined compressive strength test. Soil mineralogy tests including cation exchange capacity and specific surface area were performed to determine soil mineralogy behaviors. In addition micro tests such as Scanning Electron Microscope (SEM) imaging, energy dispersive spectrometer tests were performed to determine micro structure and elemental behavior of both treated and untreated soils. Further studies were conducted on the samples treated in the field as well. With Carrollton soil, it is found the standard compaction curve is altered for the treated soil. The optimum moisture content increases while the maximum dry density decreases. For treated soil compacted at the optimum moisture content

and maximum dry density of the treated soil, more than 50% of swell reduction is observed and the UCS of the treated soil slightly decreases. For Burlinson soil, the standard compaction curve of the treated soil is similar to the one of untreated soil. The ionic soil stabilizer is found to successfully reduce the swelling potential and PVR of the active zone of expansive soil generally extending up to 10 feet in field treatment. In the field, the soil is usually wetted to near saturation with the liquid stabilizer. The application mass ratio which is the amount of stabilizer available for soil solids is relatively higher because of the treatment method used in the field. The tests in the laboratory were done at the moisture content near to optimum. In the light that improvements were observed with the Burlinson soil, the stabilizer shows a potential in expansive soil stabilization. There are some discrepancies in findings from the lab and the field which can be ruled out in the future with the development of techniques to closely simulate the field condition. Ineffectiveness of stabilizer on Carrollton soil at given test conditions might be an indication that stabilizers work under certain specified conditions only and concludes that pre-study of the suitability of stabilizer is essential. Nevertheless, incorporating all the shortcomings in the current study, ionic stabilizers can have a good potential in the future for stabilization of expansive soil.

Proceedings of Workshop on Expansive Clays and Shales in Highway Design and Construction, December 13-15, 1972:

Preface - Donald Roy Lamb 1973

These proceedings are comprised of technical papers, reports remarks and discussions presented at the workshop on "expansive clays and shales in highway design and construction," in Denver, Colorado. The proceedings cover the state of the art on highway design and construction on expansive clays and shales.

Lime Stabilisation - C. D. F. Rogers 1996

This book has been compiled to meet the increased need for knowledge on alternative ground improvement techniques using lime. It brings together expertise and experience from industry and academia to provide an overview of lime stabilisation.

Ground Improvement Techniques - T. G.

Sitharam 2021-03-24

This volume presents select papers presented at the 7th International Conference on Recent Advances in Geotechnical Earthquake Engineering and Soil Dynamics. The papers discuss advances in the fields of soil dynamics and geotechnical earthquake engineering. Some of the themes include slope stability, shallow and deep foundations, geosynthetics, ground improvement techniques, etc. A strong emphasis is placed on connecting academic research and field practice, with many examples, case studies, best practices, and discussions on performance based design. This volume will be of interest to researchers and practicing engineers alike.

Proceedings of AICCE'19 - Fadzli Mohamed Nazri 2019-11-28

This book gathers the latest research, innovations, and applications in the field of civil engineering, as presented by leading national and international academics, researchers, engineers, and postgraduate students at the AWAM International Conference on Civil Engineering 2019 (AICCE'19), held in Penang, Malaysia on August 21-22, 2019. The book covers highly diverse topics in the main fields of civil engineering, including structural and earthquake engineering, environmental engineering, geotechnical engineering, highway and transportation engineering, water resources engineering, and geomatic and construction management. In line with the conference theme, "Transforming the Nation for a Sustainable Tomorrow", which relates to the United Nations' 17 Global Goals for Sustainable Development, it highlights important elements in the planning and development stages to establish design standards beneficial to the environment and its surroundings. The contributions introduce numerous exciting ideas that spur novel research directions and foster multidisciplinary collaborations between various specialists in the field of civil engineering.

Advances in Computer Methods and

Geomechanics - Amit Prashant 2020-01-14

This volume presents selected papers from IACMAG Symposium, The major themes covered in this conference are Earthquake Engineering, Ground Improvement and Constitutive Modelling. This volume will be of interest to researchers and practitioners in geotechnical

and geomechanical engineering.

Latest Thoughts on Ground Improvement Techniques - Hany Shehata 2018-10-27

The volume contains research studies that cover a wide range of topics related to ground improvement and subsurface structures. This selection of papers represents the state-of-the-art in the analysis and design of different techniques of the ground improvement and deep mixing techniques. It provides engineers and researchers with an update on the recent development in ground improvement techniques and on the analysis and design of important soil

structures problems. The volume is based on the best contributions to the 2nd GeoMEast International Congress and Exhibition on Sustainable Civil Infrastructures, Egypt 2018 - The official international congress of the Soil-Structure Interaction Group in Egypt (SSIGE).
Property Changes in Lime Treated Expansive Clays Under Continuous Leaching - Larry D. McCallister 1990

Soil and Material Inputs for Mechanistic-empirical Pavement Design 2007 - American Society of Civil Engineers 2007